CLAIMS

What is claimed is:

1. Apparatus for manual control of a driving and/or lifting gear of a hoisting device; comprising:

   a control element configured as handle for inputting at least one desired value by applying a manual force upon the control element;

   a biasing means for prestressing the control element in a desired direction;

   at least one electrical transducer, coupled to the control element, for converting the manual force acting in the desired direction into an electric signal, wherein the transducer includes a force sensor having a sensor surface which extends perpendicular to the desired direction and interacts with the control element.

2. The apparatus of claim 1, wherein the transducer includes a push rod having a curved end surface acting upon the sensor surface, wherein the control element interacts with the sensor surface via the push rod.

3. The apparatus of claim 2, wherein the push rod has a calotte-shaped pocket for receiving a ball which partially projects out of the curved end surface.

4. The apparatus of claim 1, wherein the sensor includes a bridge circuit of electric resistors which are mounted on the sensor surface.

5. The apparatus of claim 1, wherein the force sensor includes a ceramic plate having one side forming the sensor surface.

6. The apparatus of claim 2, wherein the biasing means includes a first elastic member, wherein the control element is supported by the push rod via the first elastic member.

7. The apparatus of claim 6, wherein the control element has a housing portion for accommodating the sensor surface, the push rod and the first elastic member, wherein the first elastic member is supported indirectly by an inside surface of the housing portion.

8. The apparatus of claim 7, wherein the transducer includes an actuating element which is accessible from outside and actuated by the control element in the desired direction, wherein the biasing means includes a second elastic member supported by an inside surface of the housing portion, wherein the first elastic member is supported by the inside surface via the actuating element and the second elastic member.

9. The apparatus of claim 1, wherein the control element is defined by a longitudinal axis, wherein the sensor surface extends in relation to the longitudinal axis in an orientation selected from the group consisting of parallel orientation and transverse orientation.

10. The apparatus of claim 8, wherein each of the first and second elastic members includes a helical spring, wherein the helical spring of the first elastic member and the helical spring of the second elastic member have different sizes, wherein the actuating element is configured in the form of a hat with an outwardly projecting fin and a depression having a base, with the helical spring of greater diameter extending between the inside surface of the housing portion and the fin, and with the helical spring of smaller diameter received in the depression and extending between the base of the depression and the push rod.

11. The apparatus of claim 9, wherein the control element is configured for movement in at least one of the ways selected from the group consisting of swinging about a pivot axis extending transversely to the longitudinal axis, and displacement in a direction of the longitudinal axis.

12. The apparatus of claim 9, and further comprising a metal tube extending through the control element in coaxial relationship to the longitudinal axis.

13. The apparatus of claim 12, wherein the metal tube has an upper end for attachment of a cable and a lower end for attachment of a load-receiving member.

14. The apparatus of claim 1, and further comprising three of said transducer for operation in three separate directions which extend perpendicular to one another.

15. The apparatus of claim 1, wherein the control element includes a light barrier which delivers an operating signal, when the control element is embraced by the hand of an operator.

16. The apparatus of claim 15, wherein the electric signal of the transducer is nullified in the absence of the operating signal.

17. The apparatus of claim 1, and further comprising switching elements mounted to the control element.

18. The apparatus of claim 1, and further comprising a flexible printed circuit board arranged in the control element.

19. A hand-held control apparatus for operation of a hoisting device; comprising:

a handle;

a biasing means for prestressing the handle in an actuating direction; and

a force transducer disposed in the handle for generating an electrical signal in dependence on the magnitude and direction of a force applied upon the handle in the actuating direction, said transducer having a sensor surface configured to change a resistance in response to the applied force and extending perpendicular to the actuating direction.

20. The apparatus of claim 19, wherein the transducer includes ceramic substrate having one side forming the sensor substrate, and a bridge circuit of electric resistors which are mounted on the sensor surface.

21. The apparatus of claim 19, wherein the biasing means includes two elastic members applying spring forces in opposition to one another and thereby supporting the handle in a prestressed manner.

22. The apparatus of claim 21, wherein the elastic members include helical springs.

23. The apparatus of claim 22, wherein the biasing means includes an actuating element disposed between the elastic members and operatively connected to the handle for transmitting the applied force to the sensor surface.

24. The apparatus of claim 22, wherein the helical springs have different sizes, with the helical spring of smaller size partially received in the helical spring of greater size.

25. The apparatus of claim 19, and further comprising a metal tube extending through the control element in coaxial relationship to the longitudinal axis and having an upper end for attachment of a cable and a lower end for attachment of a load-receiving member.

26. The apparatus of claim 19, and further comprising three of said transducer for operation in each of three orthogonal directions.